**ATOM MODELS ANSWERS**

2004





2005





2006

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| --- | --- | --- | --- | --- |
| 1(a) | A helium nucleus or a doubly ionised helium atom or two protons and two neutrons (joined**)** OR a helium atom with no electrons | Correct answer. |  |  |
| 1(b) | To prevent the alpha particles being stopped by gas molecules.  Accept: stopped, deviated, can’t travel long distance in air, air disrupts path.  Don’t Accept: affect, react, interfere, prevent ionisation. | Correct answer. |  |  |
| 1(c) | To provide a narrow (or collimated) beam of alpha particles OR ensure alpha hits perpendicular to gold foil. | Correct answer. |  |  |
| 1(d) | Most of the gold **atom** is empty space. | Correct answer. |  |  |
| 1(e) | The nucleus must be **positively** charged to cause the **positive** alpha particles to **repel** (or rebound).  The nucleus must be **dense** to cause the alpha particles to **rebound.** | One description correct. | Both descriptions correct  **or**  One description correct and one correct explanation. | Both descriptions correct  **and**  one correct explanation. |

2007

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| ONE  (a) | | The Dalton model proposed that matter was made of **indivisible atoms / smallest building block of matter** (The Dalton model had no electrons or protons).  The Thomson (“plum pudding”) model proposed that the atom was a **positive sphere** withnegatively charged **electrons embedded in it**. The atom as whole was neutral. (The Thomson model did not have protons.)  The Rutherford model proposed that the atom had a **central positive nucleus**. The negatively charged **electrons were in orbit** around the nucleus of the atom. The atom as whole was neutral. The **atom was mainly space.** (The Rutherford model had electrons and protons.)  (Thomson and Rutherford BOTH predicted the atom was mainly space.) | | Dalton model **or** Thompson model **OR** 2 of 3 ideas from Rutherford model explained.  (Neutron mentioned in Rutherford model does not negate answer.) | | **Two** models correctly explained.  (2 of 3 ideas from Rutherford model is sufficient.)  (Neutron mentioned in Rutherford model does not negate answer.) | | **All** models correctly explained.  (2 of 3 ideas from Rutherford model is sufficient.)  (Neutron mentioned in Rutherford model does not negate answer.) |
| (b) | | (Most of) the alpha particles would go straight through / alpha particles should only be deflected by small angles as they pass through / uniform scattering. | | (Most of) the alpha particles would go straight through / alpha particles should only be deflected by small angles as they pass through / uniform scattering. | |  | |  |
| (c) | | (Most of the) alpha particles went straight through.  (Some of the) particles were deflected away.  (A very few of the) particles were reflected right back / deflected through large angles. | | **TWO** correct observations. | | **ALL THREE** correct observations. | |  |
| (d) | | If air were present in the chamber the alpha particles would not travel far (alpha particles can penetrate only 5cm in air) / be stopped / lose energy / path would change / be deviated **because** of collisions with air particles.  The air (particles) would be ionised / become positively or negatively charged / lose electrons / change from atoms to ions **because** alpha particles are highly ionising and they would ionise the air as they passed through it. | | Alpha particles would not travel far / be stopped / lose energy / path would change / be deviated (do not accept “affect”, “react”, “interfere”) / alpha becomes a helium atom  **OR**  Air would be ionised / become positively or negatively charged / lose electrons / change from atoms to ions (do not accept “react”). | | Alpha particles would not travel far / be stopped / lose energy / path would change / be deviated (do not accept “affect”, “react”, “interfere”) / alpha becomes a helium atom.  **AND**  Air would be ionised / become positively or negatively charged / lose electrons / change from atoms to ions (do not accept “react”). | |  | | |
| (e) | | Beta particles (which are more penetrating) would almost all go straight through the gold foil.  **OR**  Greater scattering effect so more Beta particles deflected through large angles (very few would be scattered through small angles)  **OR**  greater backscattering. | | (Almost all) Beta particles would through the gold foil.  **OR**  More Beta particles scattered through large angles / greater backscattering. | |  | |  | | |